Assessing critical habitat: Evaluating the relative contribution of habitats to population persistence

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A principal challenge of species conservation is to identify the specific habitats that are essential for long-term persistence or recovery of imperiled species. However, many approaches to identifying important habitats do not provide direct insight into the contribution of habitats to population persistence. To assess how habitats contribute to overall population viability and characterize their relative importance, a spatially-explicit population viability model was used to integrate a species occurrence model with habitat quality and demographic information to simulate the population dynamics of the Ord's kangaroo rat in Alberta, Canada. Long-term productivity (births-deaths) in each patch was simulated and iterative habitat removal experiments generated estimates of the relative contribution of habitat types to overall population viability. Both methods provided the basis for prioritizing habitats for conservation. Our approach was particularly useful for identifying habitats that did not contribute to population viability. 39% of habitat represented sinks and their removal increased estimated population viability. This approach can be invaluable when assessing critical habitat, particularly in regions with variable habitat quality. Approaches that do not incorporate population dynamics may undermine conservation efforts by under- or over-estimating the value of habitat patches, erroneously protecting sink habitats, or failing to prioritize key source habitats.